

**AMENDMENTS TO THE CLAIMS**

1       1. (Original) An apparatus for amplifying two collinearly propagating beams of monochromatic  
2                  coherent radiation at optical frequencies  $\nu_0$  and  $\nu_0'$ , comprising:

3                  a vessel for containing a gas and maintaining an excitation in the gas volume;

4  
5                  wherein intense narrow-band fluorescence is emitted from said excitation at frequencies  $\nu_0$  and  
6                   $\nu_0'$  of allowed optical transitions of constituents of the gas, wherein said optical  
7                  transitions share a common upper energy level and form a  $\Lambda$  type structure, and wherein  
8                  one or both lower energy levels are populated in said gas volume, whereby  
9                  monochromatic laser beams at frequencies  $\nu_0$  and  $\nu_0'$  propagating collinearly through  
10                 said gas volume containing vessel nonlinearly convert photons from said fluorescence  
11                 into photons of said propagating beams, thus amplifying said beams.

1       2. The apparatus of claim 1, further comprising:

2  
3                  means for producing monochromatic laser beams at frequencies  $\nu_0$  and  $\nu_0'$ .

1       3. (Original) The apparatus of claim 2, wherein the monochromatic laser beams at frequencies  
2                   $\nu_0$  and  $\nu_0'$  are continuous (CW) laser beams.

1       4. (Original) The apparatus of claim 2, wherein the monochromatic laser beams at frequencies  
2                   $\nu_0$  and  $\nu_0'$  are pulsed laser beams.

1       5. (Original) The apparatus of claim 2, wherein the monochromatic laser beams at frequencies  
2                   $\nu_0$  and  $\nu_0'$  are laser beams are each a continuous series of Q-switched pulses.

6. (Original) The apparatus of claim 2, wherein the monochromatic laser beams at frequencies  $\nu_0$  and  $\nu_0'$  are laser beams are each a continuous series of mode-locked-pulses.

1 7. (Original) The apparatus of claim 6, wherein the monochromatic laser beams at frequencies  
2  $\nu_0$  and  $\nu_0'$  are laser beams are each a continuous series of femtosecond pulses.

3  
4 8. (Original) The apparatus of claim 2, further comprising:

5  
6 reflective mirrors forming a optical cavity about the gas volume containing vessel; and  
7  
8 means for directing said beams to propagate collinearly in said optical laser cavity for the time  
9 required for amplification of light at frequencies  $\nu_0$  and  $\nu_0'$ .

1 9. (Original) The apparatus of claim 1, further comprising:

2  
3 reflective mirrors forming a optical cavity about said gas volume containing vessel, wherein  
4 light at frequencies  $\nu_0$  and  $\nu_0'$  is amplified.

1 10. (Presently amended) The apparatus of claim 1, wherein continuous and efficient conversion  
2 of photons of fluorescence into photons of coherent light beams at frequencies  $\nu_0$  and  $\nu_0$   
3 '  
4 occurs by the nonlinear process of stimulated hyper-Raman scattering (SHRS) occurring  
5 at every point within said gas volume containing vessel whereat wherin both said  
6 emitted fluorescence intensity and said two collinearly propagating beams of  
monochromatic coherent radiation propagating light beam intensities are present.

1 11. (Presently amended) The apparatus of claim 1, wherein said three specified-species levels  
2 forming a  $\Lambda$ -type structure with resonance frequencies at  $\nu_0$  and  $\nu_0'$  are both hyperfine

3 levels of the Cs  $6S_{1/2}$  ground electronic state and one hyperfine level of the Cs  $6P_{1/2}$   
4 excited electronic state.

1 12. (Presently amended) The apparatus of claim 1, wherein said three specified-species levels  
2 forming a  $\Lambda$ -type structure with resonance frequencies at  $\nu_0$  and  $\nu_0'$  are both hyperfine  
3 levels of the  $6P_{1/2}$  ground electronic state of  $^{203}Tl$  and the  $F=1$  hyperfine level of the  
4  $7S_{1/2}$  excited electronic state of ~~said same thallium isotope~~.

1 13. (Presently amended) The apparatus of claim 1, wherein said three specified-species levels  
2 forming a  $\Lambda$ -type structure with resonance frequencies at  $\nu_0$  and  $\nu_0'$  are both hyperfine  
3 levels of the  $6S_{1/2}$  ground electronic state of either singly ionized  $^{199}Hg$  or  $^{201}Hg$  and a  
4 hyperfine level of the  $6P_{1/2}$  excited electronic state of ~~the same singly ionized isotope~~  
5 that is coupled by dipole-allowed transitions to both said lower levels.

1 14. (Presently amended) The apparatus of claim 1, wherein said three specified-species levels  
2 forming a  $\Lambda$ -type structure with resonance frequencies at  $\nu_0$  and  $\nu_0'$  are both two  
3 hyperfine levels of the  $5P_{3/2}$  ground electronic state of any singly ionized odd isotope of  
4  $Xe$  and one hyperfine level of the  $5S_{1/2}$  excited electronic state of ~~the same singly ionized~~  
5 ~~xenon isotope~~ that is coupled by dipole-allowed transitions to both lower levels.

1 15. (Original) The apparatus of claim 1, further comprising a plurality of gas volume  
2 containing vessels wherein each vessel is a source emitting two output beams of highly  
3 monochromatic coherent radiation at frequencies  $\nu_0$  and  $\nu_0'$ .

1 16. (Original) The apparatus of claim 15, wherein the output beams of each of the plurality of  
2 gas volume containing vessels are arranged as an array and directed to point in the same  
3 direction, and wherein the phase of each beam is varied to form a *phased directional*  
4 *array*.

5       17. (Original) The apparatus of claim 16, further comprising a cascaded series of increasingly  
6           sized gas volume containing vessels for each beam, wherein the output of each of the  
7           plurality of sources is directed into a cascade of increasingly sized gas volume containing  
8           vessels.

1       18. (Original) The apparatus of claim 1, further comprising a cascaded series of increasingly  
2           sized gas volume containing vessels, wherein the amplified light at frequencies  $\nu_0$  and  
3            $\nu_0'$  is amplified in the cascade of increasingly sized gas volume containing vessels.

19. (Original) The apparatus of claim 1, wherein said gas volume containing vessel is a heat  
pipe discharge tube (HPDT).